



Easy-Lift Extension Ladder

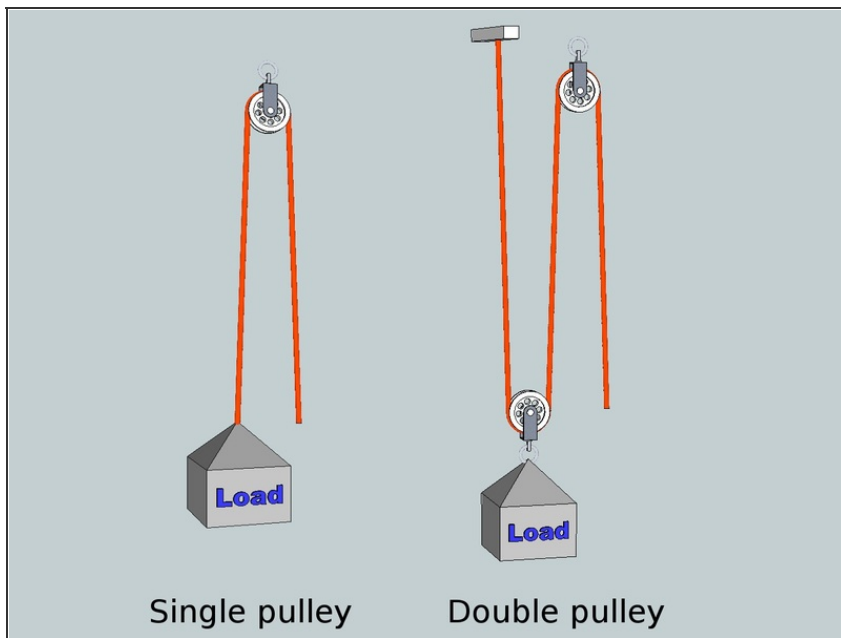
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SUMMARY

For me, a big drawback of extension ladders is that it usually takes a lot of effort to extend them to the desired height. This is partly due to the way in which they are rigged. Typically, the ladder is operated by a rope which is fastened to the bottom of the extending part of the ladder. The rope runs through a pulley at the top of the stationary part and back down to ground level for the operator to grasp. This simple arrangement is inexpensive to manufacture but it requires a force on the rope which is equal to the weight of the moving portion of the ladder. If the ladder is large, or if the moving parts have a high degree of friction, the ladder can be very difficult to extend when it is standing upright. This, in turn, makes it difficult to control the ladder and compromises safety.

I recently obtained an old extension ladder for free. Its rope was missing and while I was measuring it to find out how much rope I needed to buy it occurred to me that I could convert the ladder to a double-pulley system which would make it easier and safer to use.

Step 1 — Analyzing the mechanism



- In the stock extension ladder, the single pulley simply translates motion from one direction to another. The force required to extend the ladder is equal to the weight of the ladder's moving portion.
- In a double-pulley system, additional motion is traded to gain force. The rope needs to be pulled twice as far, but the force required is equal to only half of the weight being lifted.
- The second pulley will be installed at the bottom of the moving portion of the ladder. One end of the rope will then be fastened to the top of the stationary portion. The rope will run down the ladder and through the new pulley at the bottom of the moving portion, back up and through the original pulley at the top of the stationary portion and then down to the operator at ground level.

Step 2 — Parts required



- Pulley
- Bolt and nylock nut to fit ring on pulley
- Flat washers to fit bolt
- Metal strap
- Rope (approximately three times the length of the ladder)

Step 3 — Making the retaining strap



- I used a strap originally designed to hold a 2" metal downspout to the wall of a house. The strap was exactly the length I needed. The holes in the strap had to be enlarged to 3/8" to accommodate the bolt.
- Bend the strap around the bottom rung of the moving portion of the ladder.

Step 4 — Installing the pulley assembly



- Put a washer on the bolt, slip the ring of the pulley between the ends of the strap and insert the bolt.
- Install another washer and the nut. Tighten the assembly so that the pulley is held in an upright position when the ladder is stood on end.
- Note: Make sure that the pulley does not hit the rungs on the other half of the ladder as the ladder is extended and retracted. Bend the strap as necessary to provide clearance. 

Step 5 — Installing the rope



- Tie the rope to the top rung of the stationary portion of the ladder, next to the original pulley. Use a bowline knot or something similar.
- Thread the rope between the two halves of the ladder to the bottom and run it through the newly-installed pulley.
- Thread the rope along the same path back to the top of the ladder and through the original pulley.

Step 6 — Finishing the conversion



- Run the rope down the backside of the ladder to the bottom and cut it to length.
- If desired, leave some extra length so that you can tie the rope to the bottom rung of the stationary portion of the ladder. This helps keep the rope under control when you are moving the ladder around.
- If you are using a synthetic rope as I did, heat-seal the end of the rope to keep it from unraveling. Matthew Cox has supplied [this guide](#) for sealing the end of the rope.



The rope on a stock extension ladder is often polypropylene or something similar. It is tough but not particularly flexible. I selected a woven nylon rope which is abrasion-resistant and very supple.

After finishing the modification I stood the ladder upright and tested it. Extending the ladder was almost effortless. I've used it on numerous occasions since then and I'm very pleased with it.

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